SAFE Flame™

SafeFlame Flame Detection Installation Manual

October, 2012

NOTICE:
Installers of any SafeFlame products or systems must be trained and hold a current and valid training certificate number. Warranty will be void if installed by unauthorized personnel.

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NOTICE:
THESE INSTRUCTIONS DO NOT PURPORT TO COVER ALL DETAILS OR VARIATIONS IN EQUIPMENT, OR TO PROVIDE FOR EVERY POSSIBLE CONTIGENCY IN CONNECTION, INSTALLATION, OPERATION OR MAINTENANCE OF SAFEFLAME FLAME DETECTION SYSTEMS.

SHOULD FURTHER INFORMATION BE DESIRED OR SHOULD PARTICULAR PROBLEMS ARISE, WHICH ARE NOT COVERED SUFFICIENTLY FOR THE PURCHASERS PURPOSE, THE MATTER SHOULD BE REFERRED TO SAFE FIRE DETECTION, INC.

INSTALLATION, COMMISSIONING, SERVICE AND MAINTENANCE SHOULD ONLY BE PERFORMED BY SAFE FIRE DETECTION, INC. OR BY AN AUTHORIZED DISTRIBUTOR / REPRESENTATIVE FAMILIAR WITH ALL RELEVANT PROCEDURES AND HAZARDS. FOR INFORMATION REGARDING TRAINING SCHOOLS OR FACTORY APPROVED CERTIFICATION, PLEASE CONTACT SAFE FIRE DETECTION.

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Safe Fire Detection, Inc. reserves the right to change any information contained in this manual without notice.

Codes and Standards:
Safe Fire Detection, Inc. strongly recommends that this manual be read in conjunction with the appropriate local codes and standards for fire detection systems and electrical connections.

Warranty Information

Safe Fire Detection's new Flame Detector, SafeFlame is a flame detector, not a complete system, and must interface with an approved fire alarm panel that meets all local and national codes to become a system

All accessories pertaining to the detector for installation and mounting must be purchased from Safe Fire Detection or the warranty may be void. If a system is desired, the fire alarm control/releasing panel can be purchased from Safe Fire Detection to create a system, and if all it's components and accessories are purchased from Safe Fire Detection Inc., Safe Fire Detection Inc. will honor it's warranty as stated below. If non-approved mounting hardware is used and/or manufacturer's installation instructions are not complied with fully, the detector warranty may be void.

Seller warrants that detectors and/or systems purchased from Safe Fire Detection will, under normal use and service, be free from defects in material and workmanship for a period of five (5) year from the date of original sale. All parts and repairs under, the same conditions, as the systems above will be warranted for ninety (90) days. Seller agrees, upon written notice from Buyer given no later than thirty (30) days after the defect is discovered, to repair or replace at the Seller's option any part which, after examination by Seller, is disclosed to have been defective provided that such product is returned to Seller transportation prepaid during the warranty period. This warranty does not apply to any damage resulting from accident, improper installation, misuse or abuse. The full extents of Seller's warranty obligations are to repair or replace any defective part. Return Transportation is the responsibility of the buyer.

There are no other warranty obligations of seller, including any warranty of merchantability or fitness for a particular purpose, either expressed or implied.

Seller is not liable for any other costs, delays, labor charges, shipping or handling charges for warranty parts, or claims, nor for any consequential or incidental damages with respect to the product for its use.

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This guide is to be used as a general guideline for installing a SafeFlame flame detection system. Please be sure to check all local and state codes prior to designing and installing a system. It is advisable to contact the local AHJ in the planning stages of a project.

1. Safe Introduction

Safe Fire Detection, Inc. is committed to providing the best customer support in the industry. This provides our clients with the satisfaction of knowing that their valuable assets and business operation are our greatest concerns. This trust has been earned through 40 years of proven product reliability, dedication, and by providing unparalleled detection helping safeguard facilities around the world.

Safe Fire Detection's products have been leading the Early Warning Fire Detection (EWFD) market since 1972, protecting loss from fire, smoke, heat and water. Our new product line, SafeFlame, is revolutionizing flame detection by implementing a more versatile flame detector, with greater detection distances combined with the lowest cost in the industry.

We have built our reputation not just on products, but customer focused solutions. We combine extensive industry knowledge with solid technical expertise to help our clients customers safeguard their valuable assets.

This manual will provide information regarding the proper installation of a SafeFlame detection system (see warranty information), as well as a guide in planning for adequate coverage of the protected areas in accordance with accepted fire protection principles. The current NFPA 72 National spacing and location for adequate area protection. It is important to note that codes, standards, and regulatory requirements do change over time and it is highly recommended that prior to planning and installation, the Authority Having Jurisdiction (AHJ) be consulted to ensure compliance.

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2. SafeFlame UV/IR Introduction

2.1 Overview

SafeFlame is a UV/IR type flame detector that pyroelectric (IR Detectors) and photoelectric (UV Detectors) effects to judge the change in temperature and radiation. When radiation from a fire hits the small pyroelectric crystal in the IR detector it causes the crystal to heat up sending an electronic signal out, causing an alarm to be triggered.

The advanced technology in the SafeFlame UV/IR detectors give the detectors an adjustable detection range of a maximum of 100 feet and a viewing angle of 90° horizontal and 90° vertical.

Both the SF100A and the SF100SX come standard with 0-20mA current source, RS-485 communication, and user selectable Warning (Pre-Alarm) and Fault relays. The SafeFlame UV/IR detectors are available in Standard (Aluminum) and Explosion Proof (Stainless Steel).

2.1.1 Models and Types

SafeFlame UV/IR Aluminum
SF100A

SafeFlame UV/IR Stainless Steel Explosion Proof
SF100SX

The SafeFlame UV/IR Flame Detector comes in two varieties; standard and explosion proof. The standard SafeFlame detector is made from aluminum and the explosion proof SafeFlame detector is made from stainless steel. Their part numbers are notated below:

SF100A - SafeFlame UV/IR Standard

SF100SX - SafeFlame UV/IR Explosion Proof

2.2 Principles of Operation

2.2.1 UV/IR Flame Detector

SafeFlame's UV/IR flame detector uses an ultra high signal to noise ratio UV sensor and a separate IR sensor to offer superior flame detection. The UV sensor offers superior sensitivity while the IR sensor ensures resistance to false alarms from things like solar spikes, arc welding, lighting and X-Rays.

The IR sensor works on the 4.1-4.6 micron spectral range. The same spectral range as a fire. UV/IR detection uses pyroelectric (IR Detectors) and photoelectric (UV Detectors) effects to judge the change in temperature and radiation. When radiation from a fire hits the small pyroelectric crystal in the IR detector it causes the crystal to heat up sending an electronic signal out, causing an alarm to be triggered. An opposite electrical charge is given when the pyroelectric crystal is cooled down.

SafeFlame with UV detectors use photoelectric sensors to detect a fire. The radiation coming from the fire heats up the UV sensor causing electrons to flow signaling that a fire is present.

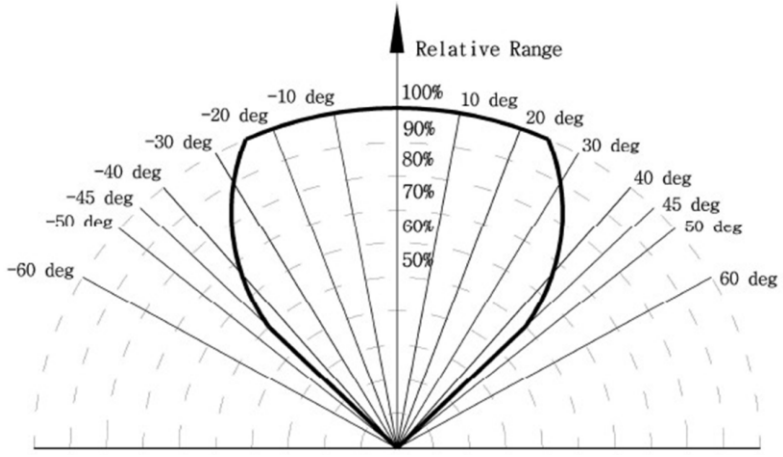
2.2.2 RS-485 Modbus

The SF100S/X is capable of connecting to any RS-485 communication network by connecting to a universal controller. The detector is capable of informing the network of the current product condition (fire, fault, warning) and can be used in synch with interlinking remote control.

2.3 Detector Performance Options

2.3.1 Cone of Vision

The SF100S/X have a field of view of 90° horizontal, 90° vertical.



2.3.2 Detector Sensitivity

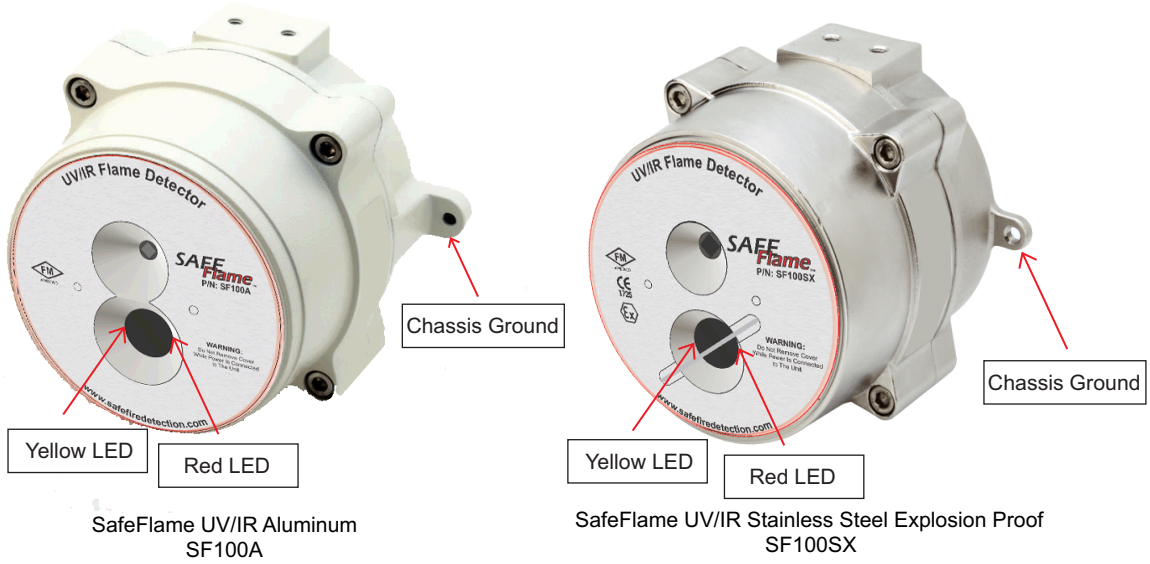
The detector has two response levels: Warning (Pre-Alarm) and Alarm. The detection range for the detector is 100 feet (30 meters) for a standard fire. A standard fire is defined as a 1ft² (0.1m²) n-heptane pan fire.

The Warning level is an alarm verification system. Having this option enabled will delay the alarm signal by approximately 5 seconds.

2.3.3 LED Indicator

Two colored LED indicators are located inside the detector, adjacent to the UV/IR sensor.

Detector Condition	**LED Color and Mode**
Normal	Yellow LED blinking (0.5Hz)
Warning	Yellow LED blinking (0.5Hz) and Red LED blinking (2Hz)
Alarm	Yellow LED blinking (0.5Hz) and Red LED solid
Reset	Yellow & Red LED blinking repeatedly (3 sec)
Power Supply/Diagnosis Test Fault	Yellow LED blinking (2Hz)
Warning at BIT Fault	Yellow LED blinking (2Hz) and Red LED blinking (2Hz)
Alarm at BIT Fault	Yellow LED blinking (2Hz) and Red LED solid



[Figure 1] Product Image LED Position indicator

2.3.4 False Alarm Protection and Immunity

The detector is immune to a variety of potential false alarm sources. Below is a table showing either the immunity to a radiation source or the distance beyond which the detector is immune to the radiation source.

Radiation Source	Immunity Distance ft(m)
Indirect or reflected sunlight	No False Alarm
Incandescent lamp 100W	No False Alarm
Fluorescent light 40W	No False Alarm
Electric Heater 1500W	No False Alarm
Blue, Green dome light XXXW	No False Alarm
Hot plate (200℃)	No False Alarm
Halogen lamp 500W (Glass)	No False Alarm
Halogen lamp 1000W (Quartz lamp)	12ft (4m)
Grinding metal	3.3ft (1m)
Arc welding (5mm, 200A)	15ft (4.6m)

2.4 SafeFlame UV/IR Specifications

2.4.1 Electrical Specifications

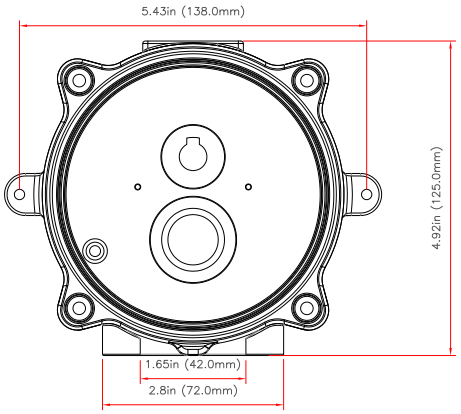
Electrical	
Recommended Voltage:	24 VDC
Rating Voltage:	17 VDC to 32 VDC
Max Input Voltage:	36 VDC
Normal Average Current:	35 mA @ 24 VDC
Max Operating Current:	70 mA @ 17 VDC
Relay Output	
Dry Contact Relays:	Fire, Fault, Warning
Rating:	2A at 28VDC, 4A at 125VAC, 2A at 250VAC
RS-485 Communication	
Non-Isolation Output:	2 Wiring
Communication Speed:	9600bps
0-20mA Current Output	
Non-Isolation Output:	Common 24V-_IN(-Power)
Max Resistance:	500Ω

2.4.2 Environmental Specifications

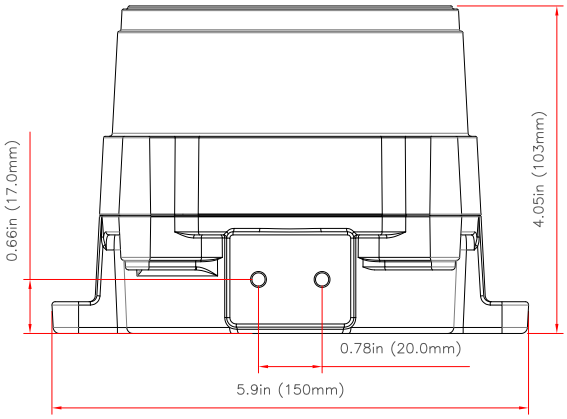
Operating Temperature:	-40°C to +75°C (-40°F to +167°F)
Storage Temperature:	-50°C to +80°C (-58°F to +176°F)
Humidity Range:	0 to 95% relative humidity

2.4.3 Mechanical Specifications

SafeFlame UV/IR Standard (SF100A)	
Enclosure (Material):	Aluminum
Weight:	Detector- 1.2kg (2.6lbs.), Detector w/ Bracket- 2.2kg (4.9lbs.)
Dimensions(Detector):	150 x 125 x 103mm (5.9” x 4.9” x 4.1”)
Dimensions (with Bracket):	150 x 171 x 347mm (5.9” x 6.7” x 13.7”)
Color:	Ivory
Conduit Connection:	2 x 1/2” PF
Wire Gauge:	12 AWG to 24 AWG
Water and Dust Tight:	IP67

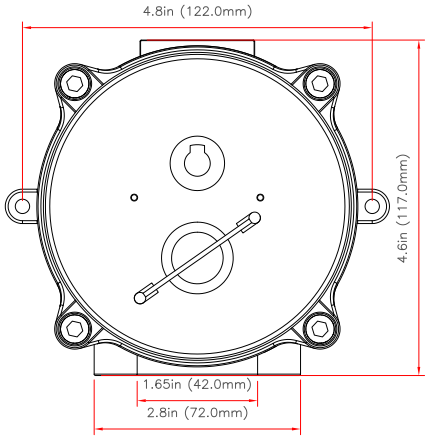


[Figure 2] Front

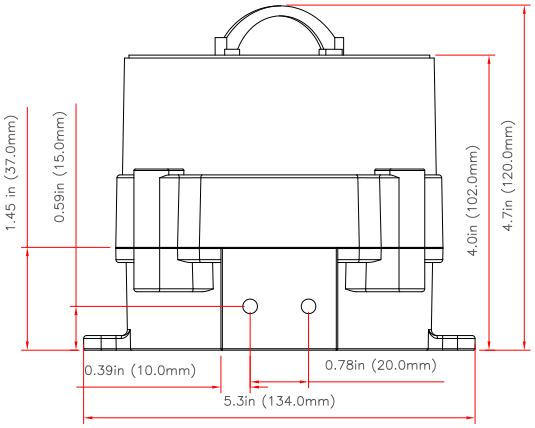


[Figure 3] Side

SafeFlame UV/IR Explosion Proof (SF100SX)	
Enclosure (Material):	316 Stainless Steel
Weight:	Detector- 2.4kg (5.3lbs.), Detector w/ Bracket- 3.4kg (7.5lbs.)
Dimensions(Detector):	134 x 117 x 120mm (5.3” x 4.6” x 4.7”)
Dimensions (with Bracket):	134 x 163 x 365.7mm (5.3” x 6.4” x 14.4”)
Color:	Metal
Conduit Connection:	½” NPT-14, M20 x 1.5
Wire Gauge:	12 AWG to 24 AWG
Hazardous Area Approvals:	Class I Div. 1 Groups B, C, and D Class II Div. 1 Groups E, F, and G Class III



[Figure 4] Front



[Figure 5] Side

3. Installation

3.1 Guidelines for Installation

For optimal detector performance and protection of the hazard, please consider the guidelines for installation:

Spacing: The number of flame detectors in the protected area is determined by the size of the area, the Cone of Vision, obstructions, and sensitivity.

Aiming: The flame detector should be pointed toward the center of the desired area of protection. Point the detector pointed at a downward angle to prevent dust and dirt build up if possible.

Sensitivity: Determined by the size of the fire at the required distance and the type of flammable materials.

Wiring: Use only 12 to 24 AWG shielded wire for all power and networking cable

Environment: Avoid areas that are outside of the operating range of the detector and areas that would be prone to false alarms.

3.2 Unpacking the Detector and Necessary Tools

Please inspect the external condition of the detector when unpacking the product. If there is any damage on the detector please contact the manufacturer immediately.

Box contents:
- SafeFlame UV/IR detector
- Mounting Bracket
- Spare bolts (detailed below)

Spare Part	Size	Q'ty	Description
Hexagon Wrench Bolt	M6x10	2	Connecting bracket to the detector
Hexagon Wrench Bolt	M6x35 (OEM)	4	Holding sensors to backplate
Button Screw (+)	M5x30	4	For mounting the bracket

Necessary Tools for Installation:
- Hexagon Wrench (Metric 5M)
- Phillips Screwdriver

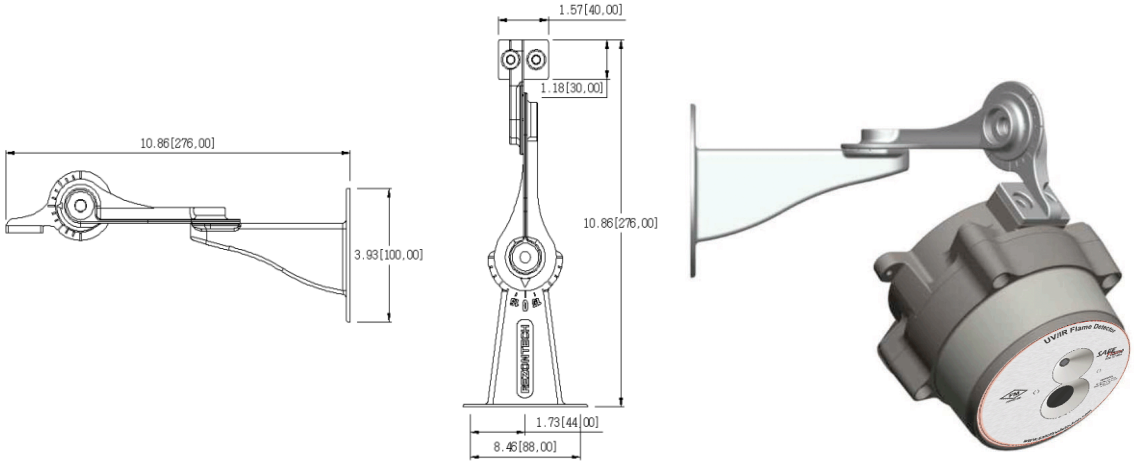
3.3 Mounting Bracket

3.3.1 Specifications

Angle Adjustment:	Horizontal 180°, Vertical 180°
Weight:	1kg
Dimensions(Bracket):	276 x 100 x 88mm (10.9” x 3.9” x 3.4”)
Color:	Ivory
Enclosure Material:	Aluminum
Wall Mounted Size:	6Φ x 4 (5mm bolt)

3.3.2 Installation

Necessary Tool:	Hexagon Wrench Driver, Screw Driver
Components:	Metric M6-10 x 2pcs, Metric M5-30 x 4pcs

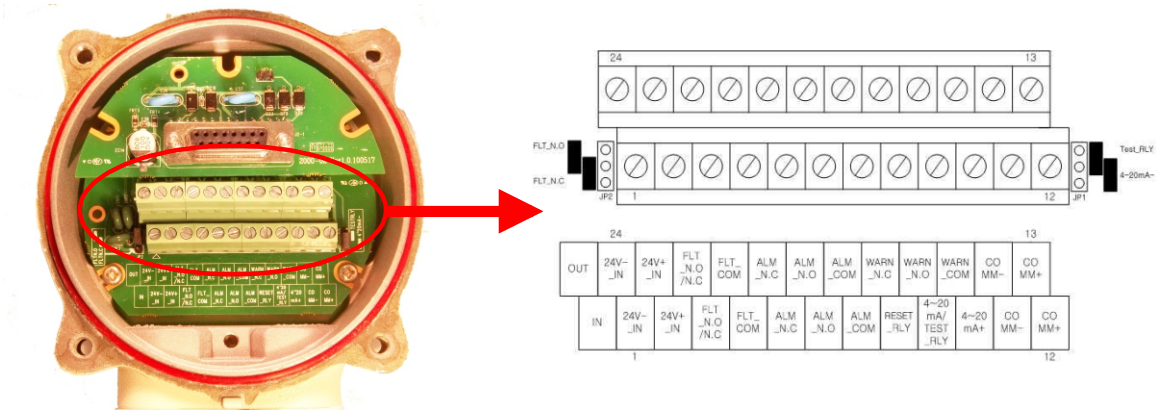


[Figure 6] Bracket and Product

3.4 Wiring and Conduit Connections

3.4.1 Terminal Connections

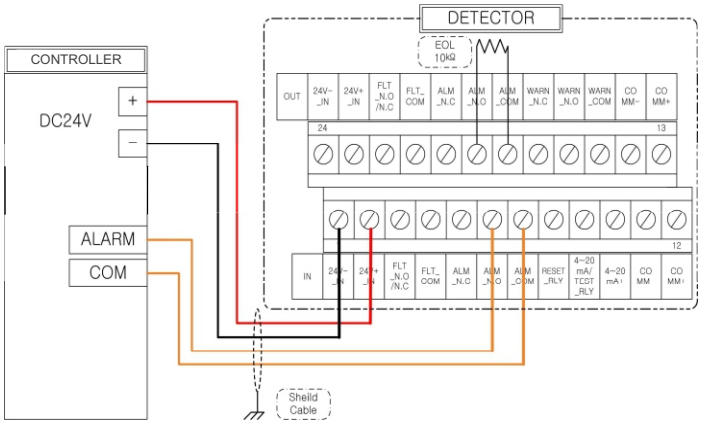
All connections are made through Terminal Board 1 (TB1) located on the interior back plate of the SF100A/SX detector.



[Figure 7] TB1 Terminal address at product cover

Alarm Relay Output: Wiring Diagram

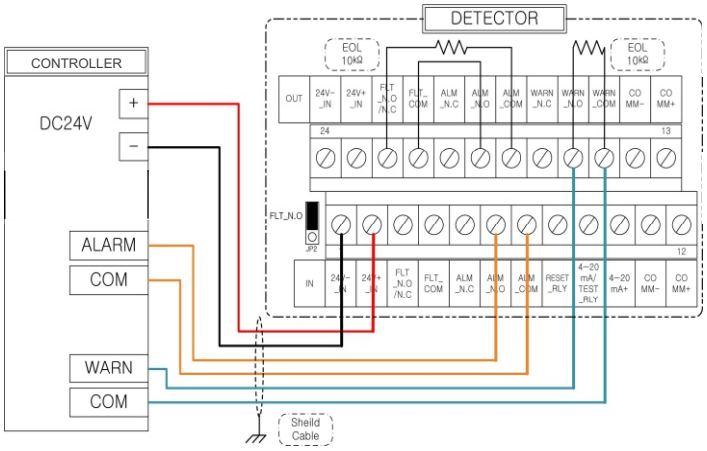
TB1	Fire Relay	Relay Status	
		Normal (De-Energized)	Fire (Energized)
5, 20	ALM_N.C.	Closed	Open
6, 19	ALM_N.O.	Open	Closed
7, 18	ALM_COM	Common	Common
Rating: 2A@28VDC, 4A@125VAC, 2A@250VAC			



[Figure 8] Terminal wiring diagram at fire alarm relay

Warning Relay Output: Wiring Diagram

TB1	Warning Relay	Relay Status	
		Normal (De-Energized)	Warning (Energized)
17	WARN_N.C.	Closed	Open
16	WARN_N.O.	Open	Closed
15	WARN_COM	Common	Common
Rating: 2A@28VDC, 4A@125VAC, 2A@250VAC			

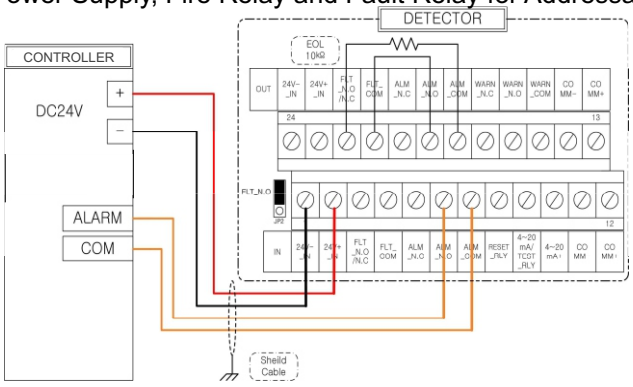


[Figure 9] Terminal wiring diagram at fault and warning relay

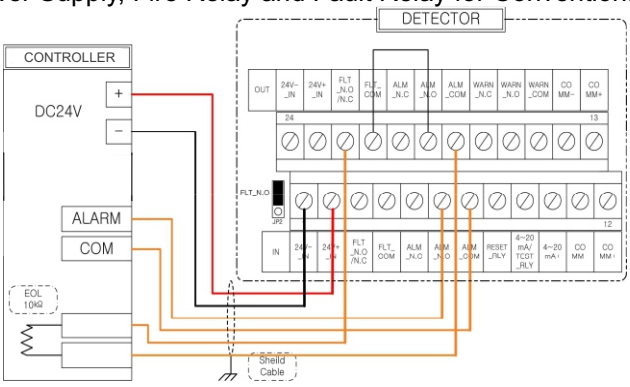
Fault Relay Output: Wiring Diagram

TB1	Fault Relay	Relay Status	
		Normal (De-Energized)	Fault (Energized)
3, 22	FLT_N.C.	Closed	Open
3, 22	FLT_N.O.	Open	Closed
4, 21	FLT_COM	Common	Common
Rating: 2A@28VDC, 4A@125VAC, 2A@250VAC -Change Fault Relay's FLT_N.O./N.C. mode accordingly by switching jumper FLT_N.O. is available by default			

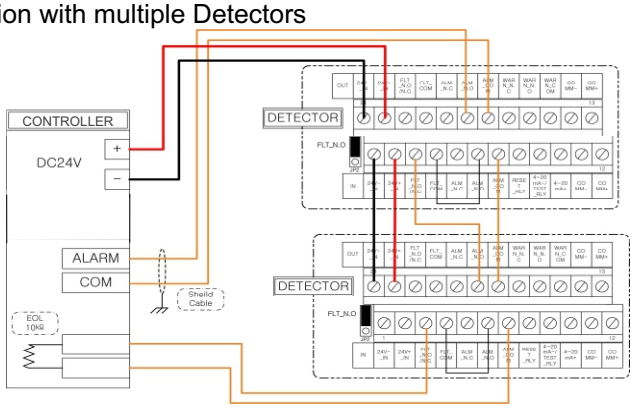
· Wiring the Power Supply, Fire Relay and Fault Relay for Addressable Systems



· Wiring the Power Supply, Fire Relay and Fault Relay for Conventional Systems



· Loop Connection with multiple Detectors

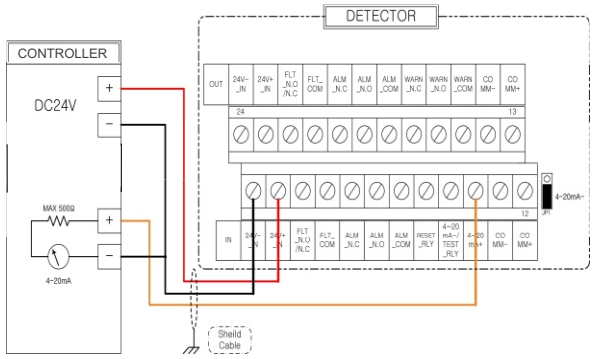


0-20mA Current Source: Wiring Diagram

This signal shows when various recorded information of current output is transmitted through electrical wiring. It is varied according to the product status.

Non-Isolation Output:	Common 24V-_IN(-Power)
Max Resistance:	500Ω

Current	Output
0mA (+0.5mA)	Connection Fault
2mA (±0.5mA)	Self-diagnosis Test Fault
4mA (±0.5mA)	Normal
8mA (±0.5mA)	IR Detection
12mA (±0.5mA)	UV Detection
16mA (±0.5mA)	Warning
20mA (±0.5mA)	Fire Detection



[Figure 10] Terminal wiring diagram schematic at 0-20mA output

RS-485: Wiring Diagram

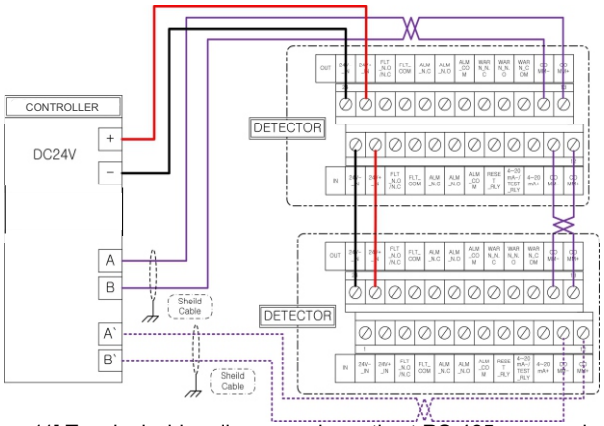
This signal does not inform product status only but also supports changing and controlling in variable setting value. And this function can be sued in synch with interlinking remote control or other systems.

Communication Specification

Non-Isolation Communication	
Full-Duplex, Half-Duplex	
9600bps basic setting	
1:N support (Client)	
Support Protocol:	Manufacturer

Signal Terminal Number

TB1	Signal Name
11	COMM-
12	COMM+
13	COMM+
14	COMM-



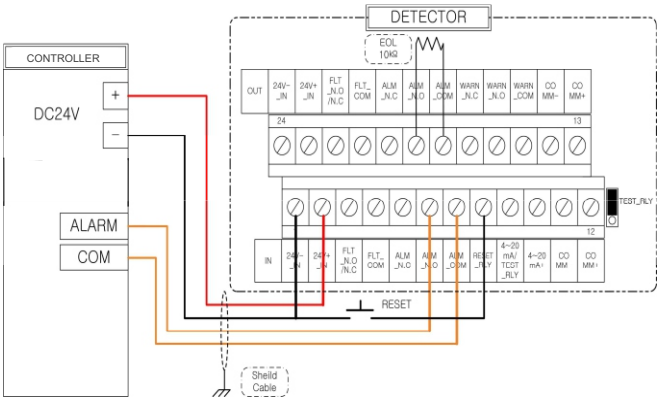
[Figure 11] Terminal wiring diagram schematic at RS-485 communication

Remote Reset: Wiring Diagram

· Signal Specification

Operating Signal:	Same level of Signal with 24V-_IN
Operating Delayed Time:	5 Seconds
Operating Continuous Time:	After cancelling operating signal + reset time

Signal Terminal Number	
TB1	**Signal Name**
8	RESET_RLY



[Figure 12] Remote reset wiring diagram

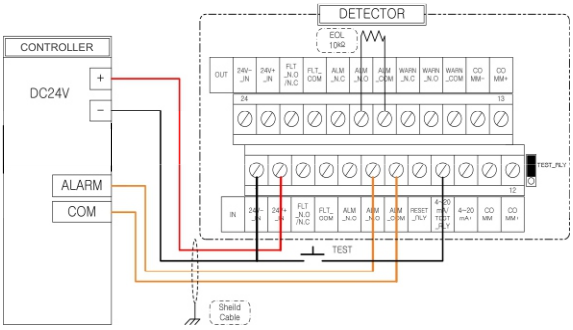
External Self-Diagnosis Test: Wiring Diagram

· Signal Specification

Operating Signal:	Same level of Signal with 24V-_IN
Operating Delayed Time:	5 Seconds
Operating Continuous Time:	Operating delayed time + 10 sec.

Signal Terminal Number	
TB1	**Signal Name**
9	TEST_RLY
Change JP1's jumper to TEST_RLY	

Result Signal	
Normal	**Fault**
Normal Output for all signals	- Fault Relay Output (De-Energized) - 2mA (±0.5mA): Self-Test Error Signal - Yellow LED blinking (2Hz) - Response of communication self-test faulty signal



[Figure 13] External self-test signal

Ground Connection

For proper operation of the detector the SafeFlame must be grounded through a wire to the chassis. Failure to establish a ground connection can lead to greater susceptibility of the detector to power surges, electromagnetic interference, and ultimately damage to the detector.

External Grounding- Connect ground wire to right side of enclosure.

3.4.2 Conduit Installation

1. Use ½" NPT-14 or M20x1.5 conduit connection or suitable explosion-proof gland to assemble the cable and conduit to the detector
2. When using conduit connection for division installation, conduit seals must be withing 18 inches (450mm) from the enclosure
3. When using conduit connection for ATEX installation, conduit seals must be placed at enclosure
4. Install the conduit including drain holes facing downward to avoid water condensation in the detector

3.5 Setting up the Detector

3.5.1 Sensitivity

The sensitivity level can be adjusted by the user according to adhere to local codes, environments or the desires of the client. Please make sure all laws, codes, and regulations are met when installing the SafeFlame detector.

Note: The detector must be powered off to adjust the sensitivity level and comes at the preset detection range of 100 ft(30m).

· To adjust the sensitivity of the detector, switch No. 3 at SW1, ON("1")

SW1				
Switch Setting			Sensitivity	Detection Range ft(m)
No. 3	No. 1	No. 2		
1	0	0	Low	60(18)
1	1	0	Middle-1	65(20)
1	0	1	Middle-2	82(25)
1	1	1	High	100(30)
-Reference source of detection range is 1' x 1' fire of n-heptane				

3.5.2 Signal Latching

This is the recovery signal when the source of the fire disappears or is out of range. This supports two kinds of settings. First, the user can reset the detector through powering "OFF" and "ON" manually or using "RESET_RLY" terminal. Second, it recovers automatically after 5 seconds if the fire detection signal is cancelled.

SW1	
Switch Setting	**Function**
No. 7	
0	Latching "OFF"
1	Latching "ON"

3.5.3 Alarm Delay

The SafeFlame is equipped with an Alarm delay option, which provides programmable time delays by changing settings. The alarm signal will be activated if the fire still exists after the programmed delay time. But if the fire disappears within the programmed delay time, the detector will return to its standby state.

The alarm delay option affects the output relays and the 0-20mA. The LEDs and the outputs indicate warning levels during the delay time only if the fire doncition exists.

SW1			
Switch Setting			**Sensitivity**
No. 4	**No. 5**	**No. 6**	
0	0	0	1
1	0	0	3
0	1	0	5
1	1	0	8
0	0	1	10
1	0	1	15
0	1	1	20
1	1	1	25
Note: With a delay of 5, the average response time is about 12 sec. for a standard fire at 100ft			

3.5.4 Built-in-Test

After installation the detector can perform self-diagnostic tests by itself from the internal sensor to the circuit.

SW1	
Switch Setting	**Function**
No. 8	
0	Self Test "OFF"
1	Self Test "ON"
- Self testing performed every 12 hours	

4. Operating and Testing the Detector

4.1 Initial Power-Up

Before powering-up a SafeFlame detector inspect all aspects of the installed equipment. This initial inspection can help to prevent future down time and improve the longevity and performance of the detectors.

Initial Operation		
		Operational or Output Status
Before Connecting Power		-Fault Relay signal Open (N.O.: De-Energized) - All LEDs off
After Connecting Power	Common	-Fault Relay signal Closed (N.C.: Energized) - After 7 seconds of self-diagnosis test, LED intersect for 3 seconds (Yellow → Red → Yellow → etc) blinking
	Normal	-All output, "Normal" signal (N.C.: Energized) - Yellow LED blinking (0.5Hz)
	Fault	- Fault Relay signal Closed (N.C.: De-Energized) - LED "Fault" signal output - 0-20mA "Fault" signal - RS-485 communication "Fault" signal

4.2 Safety Handling

Below are a few safety considerations to take into account when the SafeFlame has power connected.

- Please refer to the diagrams and specifications in the user manual
- Do not open the SafeFlame while the power is connected
- Disassembly and assembly of the internal electrical parts is not allowed by anyone except the manufacturer. Unauthorized action will void the warranty
- Before working on any equipment be sure that the detector is disconnected from any suppression or extinguishing systems.

4.3 Testing

4.3.1 Built-in-Test

The detector will automatically perform a self-diagnostic test every 12 hours.

4.3.2 Test Lamp

The TL-205 generates specific UV/IR radiation which can be detected by the SafeFlame detector series as a fire. It has an individual built-in internal power supply, making it portable with up to a 30 minute charge.

[Figure 14] TL205 Test Lamp

- Testing Procedures with the TL205
  1. Please wait for 10 seconds after power is connected. Check if Yellow LED is blinking
  2. Turn on the TL205 and point it at the front of the SafeFlame. The recommended distance between the test lamp and the detector is within 16ft(5m)
  3. If the Red LED is on, the fire is detected
  4. If the product is set to reset manually, cycle power to the detector
  5. If the Red LED does not turn on, please reduce the testing distance and try again. If that same problem persists, check the test lamp for functionality. If working properly, contact the manufacturer.

Note: If bulb No. 1 is blinking and the radiation intensity is weak, or if the No. 2 bulb is not functioning, please re-charge the test lamp. If neither the No. 1 or No. 2 bulbs turn on, it means the test lamp is defective and require repair.

Detector Status During Testing		
Status		Operational or Output Status
Before Connecting Power		-Fault Relay signal Open (N.O.: De-Energized) - All LEDs off
After Connecting Power	Common	-Fault Relay signal Closed (N.C.: Energized) - After 7 seconds of self-diagnosis test, LED intersect for 3 seconds (Yellow → Red → Yellow → etc) blinking
	Normal	-All output, “Normal” signal (N.C.: Energized) - Yellow LED blinking (0.5Hz)
	Fire	- All output “Fire” signal

5. Maintenance and Troubleshooting

This section deals with preventive maintenance, describes possible faults, and indicates corrective measures. Ignoring these instructions may cause problems with the detector and may invalidate the warranty. Whenever a unit requires service, please contact Safe Fire Detection or its authorized distributor for assistance.

Please record the maintenance process for the detector in the maintenance book. Device name, date of installation, name or supplier, and other necessary information must be recorded accordingly. If there is any service needed, the maintenance record should be sent with the detector for reference.

5.1 Maintenance

The detector must be kept as clean as possible. Clean the viewing window and the reflector of the SafeFlame periodically. The frequency of cleaning depends on the local environmental conditions and specific applications. Cleaning and operation testing must be completed at least every 6 months.

Steps for cleaning the detector:

1. Disconnect power to the detector before proceeding with any maintenance including window/lens cleaning
2. Use cleaning liquid for view window on detector. Do not forget to rinse when finished.
3. Where dust, dirt, or moisture accumulate on the window, first clean it with a soft brush, and use the cleaning liquid with a soft cloth. Finally rinse it clean with water

5.2 Troubleshooting

No LED response after power applied	1. Check that the detector is connected properly 2. Check that the detector is connected with the appropriate power supply polarity 3. Check the voltage supplied to the detector 4. Check to see if there has been an internal short due to a foreign substance
Yellow LED blinking (2Hz)	1. Check the input voltage of the product 2. Check all wiring and search for signs of for signs of foreign substances 3. If input voltage is correct, please contact the manufacturer
Output signals not recieved	1. Check that the detector is connected properly 2. Check that the wiring connections are correct according to the user manual 3. Fire signals can be measure after detection. Check if there is a signal after performing a fire test 4. Check the jumper setting for 4~20mA current output is correctly set

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